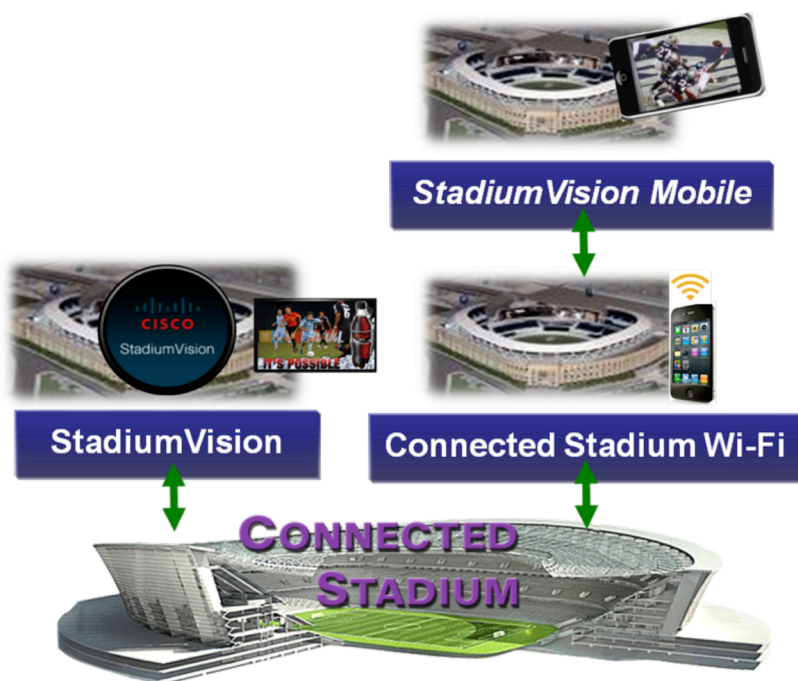


Cisco Stadiumvision Mobile Solution

Sports and entertainment venues typically have three closely-linked goals: provide fans with the best experience possible while expanding revenue streams and enhancing venue profitability. Cisco has developed a suite of Connected Sports solutions that leverage innovative technologies to help enable venues to achieve these goals.

Today's venues have already deployed the center-hung "big screens" to enhance the fan experience. Venue operators have learned how to monetize the use of these large displays through sponsorship and advertising deals. More recently, venues have started to deploy high definition (HD) TVs and digital signage solutions, such as the Cisco StadiumVision® solution shown in figure 1, which enable the display of HD video and digital media throughout the concourses, bars, clubs, and luxury suites. This too has enhanced the fan experience while presenting new and more targeted opportunities to generate revenue.

Figure 1. Cisco StadiumVision helps enable the Connected Stadium



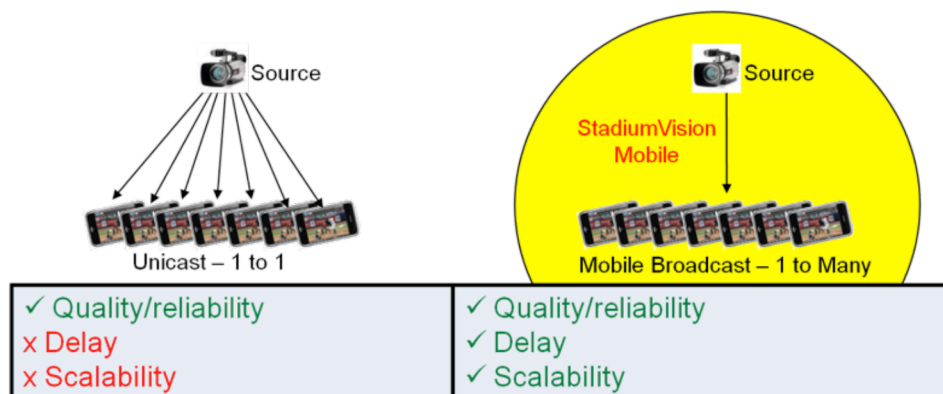
Capitalizing on the rapid adoption of smartphones and the exploding demand for data from these mobile devices, the next step is engaging fans on a more personal level by deploying high-density wireless connectivity throughout a venue. A high-density wireless network enables the delivery of rich and uniquely in-venue media, further enhancing the fan experience and generating new revenue streams. Many venues, such as AT&T Park, Dallas Cowboys' Stadium, Pittsburgh's CONSOL Energy Center, and Sporting Park stadium, have already deployed the Cisco® Connected Stadium Wi-Fi solution, which enables fans to remain "connected" while at the stadium with fast, reliable Wi-Fi access.

In addition to having access to information such as current scores, player stats, and fantasy sports, however, fans now also want access to video, whether it is live video of the game or a replay. Cisco StadiumVision Mobile, the newest solution in the Cisco Connected Sports and Entertainment™ suite, addresses this challenge of delivering rich media content in a high-density wireless environment. StadiumVision Mobile is built on the Cisco Connected Stadium Wi-Fi solution and provides real-time video broadcast over Wi-Fi to mobile devices.

Delivering video to mobile devices is not a new concept. But the current unicast methods used to deliver video to mobile devices do not scale to a high number of mobile devices in a high density area and suffer from excessive delay. The lack of scalability may not be an issue for a single user waiting at a train station and interested in downloading a highlight from yesterday's match, but it is an insurmountable barrier when hundreds or thousands of fans at a venue simultaneously want access to content. Excessive delay in live video delivery is problematic when fans can see and hear the action in front of them. Video play on the smartphone must be within a second or two of the live event.

In contrast to the severely limited, conventional unicast methods of delivering video to smartphones, the Cisco StadiumVision Mobile solution shown in figure 2 is the first to be capable of delivering low-delay and high-quality streaming video over Wi-Fi to virtually all mobile devices in a packed stadium.

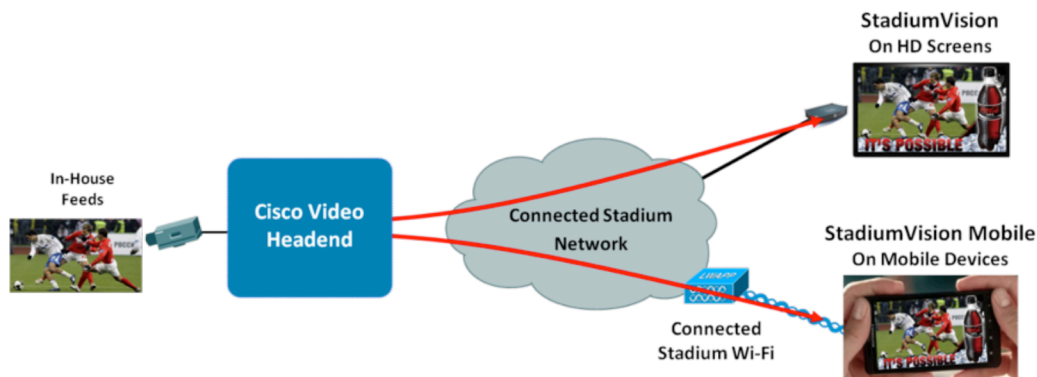
Figure 2. StadiumVision Mobile broadcast



Cisco Stadiumvision Mobile Benefits

As illustrated in figure 3, the same video content (whether in-house video or commercial broadcast feeds from a service provider) can be sent to both the StadiumVision HD displays and StadiumVision Mobile-enabled fan devices. The StadiumVision Mobile solution also allows advertisers and sponsors to push unique, targeted content and offers along with the video to the mobile devices.

Figure 3. StadiumVision video feeds



From a business perspective, the Cisco StadiumVision Mobile solution helps enable:

- A better fan experience than pure broadcast of content, because Wi-Fi also supports unicast and interactive communications, enabling application providers to further enhance the experience
- Additional revenue from new advertising and sponsorship opportunities
- Additional revenue from fans via subscription to the service and responses to special offers and advertisements
- The convenience of leveraging devices that fans already have (no need for a special-purpose device)
- An enhanced return on investment across all the Cisco Connected Sports and Entertainment solutions

From a technology perspective, the Cisco StadiumVision Mobile solution enables:

- More effective use of scarce Wi-Fi spectrum by enabling reliable multicast. The same Wi-Fi transmissions can be shared by all mobile devices requesting the same content
- High-quality and reliable video delivery to a massive number of mobile devices; no more partial or frozen images
- Low-delay delivery of in-venue content (including streaming video, audio, and data)

Cisco Stadiumvision Mobile Solution Components

The components of the Cisco StadiumVision Mobile solution shown in figure 4 include existing Cisco Connected Sports and Entertainment solutions and new hardware and software.

Figure 4. Cisco StadiumVision Mobile Solution Components

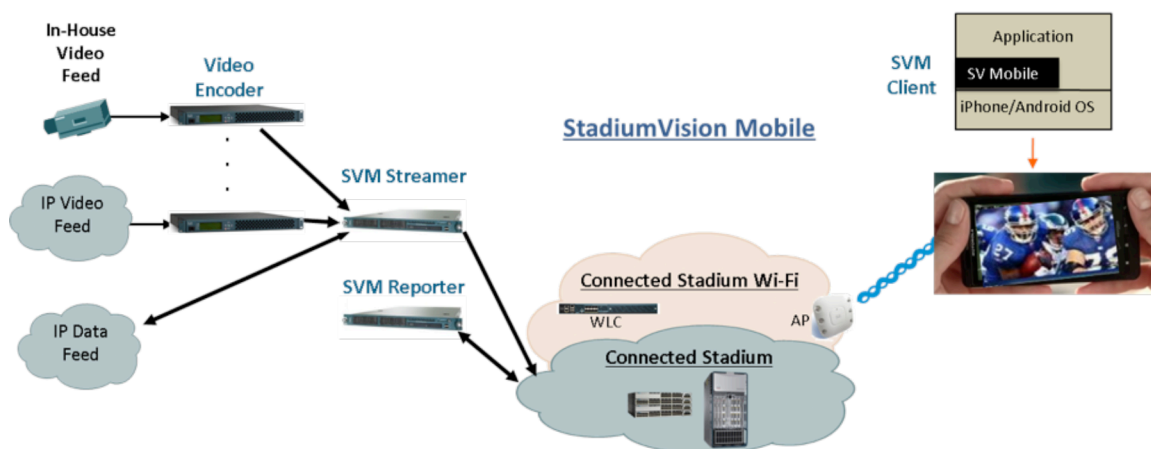


Table 1 lists the pre-requisites of the Cisco StadiumVision Mobile solution.

Table 1. Cisco StadiumVision Mobile Solution pre-requisites

Component	Requirement
Infrastructure	Cisco Connected Stadium
Wireless network	Cisco Connected Stadium Wi-Fi Solution running Wireless LAN Controller 7.2 (or later) based Stadium Special
End user mobile device	iOS 5.x and 6.x; Android Gingerbread 2.3, Ice Cream Sandwich 4.0 and Jelly Bean 4.1

Table 2 describes the components of the Cisco StadiumVision Mobile solution.

Table 2. Cisco StadiumVision Mobile Solution Components

Component	Function
Encoder	Provides encoding of in-house and commercial broadcast feeds for streaming to mobile devices. Feeds can be HD-SDI or IP multicast. A maximum of 2 encoders is required per venue.
StadiumVision Mobile Streamer	Responsible for aggregating and protecting video and data streams for reliable delivery over the Wi-Fi network.
StadiumVision Mobile Reporter	Collects mobile device statistics covering network performance, Quality of Experience (QoE), and session information. Aids in tuning and troubleshooting the Wi-Fi network and identifying popular content.
Client Software Developer's Kit	Abstracts complexity of discovering, recovering, and playing streaming video. Includes a rich set of tools to enable third parties to quickly create and test applications without having to be at a stadium.

Cisco Stadiumvision Mobile Solution Specifications

This section lists the specifications of the Cisco StadiumVision Mobile solution, as a whole, and the purpose-built components.

Cisco StadiumVision Mobile Solution Specifications

- Supports up to 4 video and 4 data streams
- Total Wi-Fi multicast bandwidth of 5 Mbps for video, data and repair streams. Typical video stream bit rate of 500 kbps for smartphones and 850 kbps for tablets. Video streams may include embedded audio stream.
- Highly efficient H.264 video encoding with AAC-LC audio, VBR rate control

-
- MPEG2-TS encapsulation over IP
 - Configurable video display size and location to support a broad range of device capabilities and application configurations

Cisco StadiumVision Mobile Streamer

- Single rack-unit platform including disk and power supply redundancy with purpose-built software for enabling reliable delivery of video and data over Wi-Fi multicast
- Receives source multicast video streams and unicast data streams and provides configurable protection of source streams

Cisco StadiumVision Mobile Reporter

- Single rack-unit platform including disk and power supply redundancy with purpose-built software for enabling the collection of mobile statistics while consuming StadiumVision Mobile
- Statistics cover network performance, user experience, and session selections

Cisco StadiumVision Mobile Software Developer's Kit

- Simplifies application developer effort by abstracting StadiumVision Mobile complexities:
 - Automatic session discovery
 - Reliable recovery of Wi-Fi multicast video and data streams
- Capable of receiving and playing 1 of the available video streams along with up to 4 data stream.
- Supports Live and Rewind functionality
- Supports smartphones and tablets of varying screen sizes
- Video can be displayed as full-screen or partial-screen, independent of device screen size and resolution
- Includes library, application tools, and documentation for rapid application development on popular iOS and Android environments

For More Information

For more information about the Cisco StadiumVision Mobile solution and the benefits it provides, please visit <http://www.cisco.com/go/sports> or contact your local Cisco account representative.



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